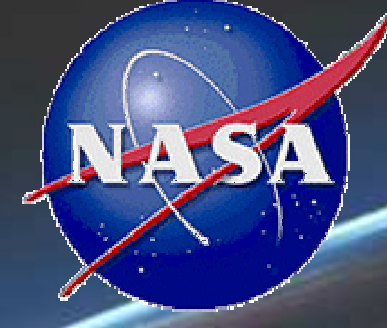
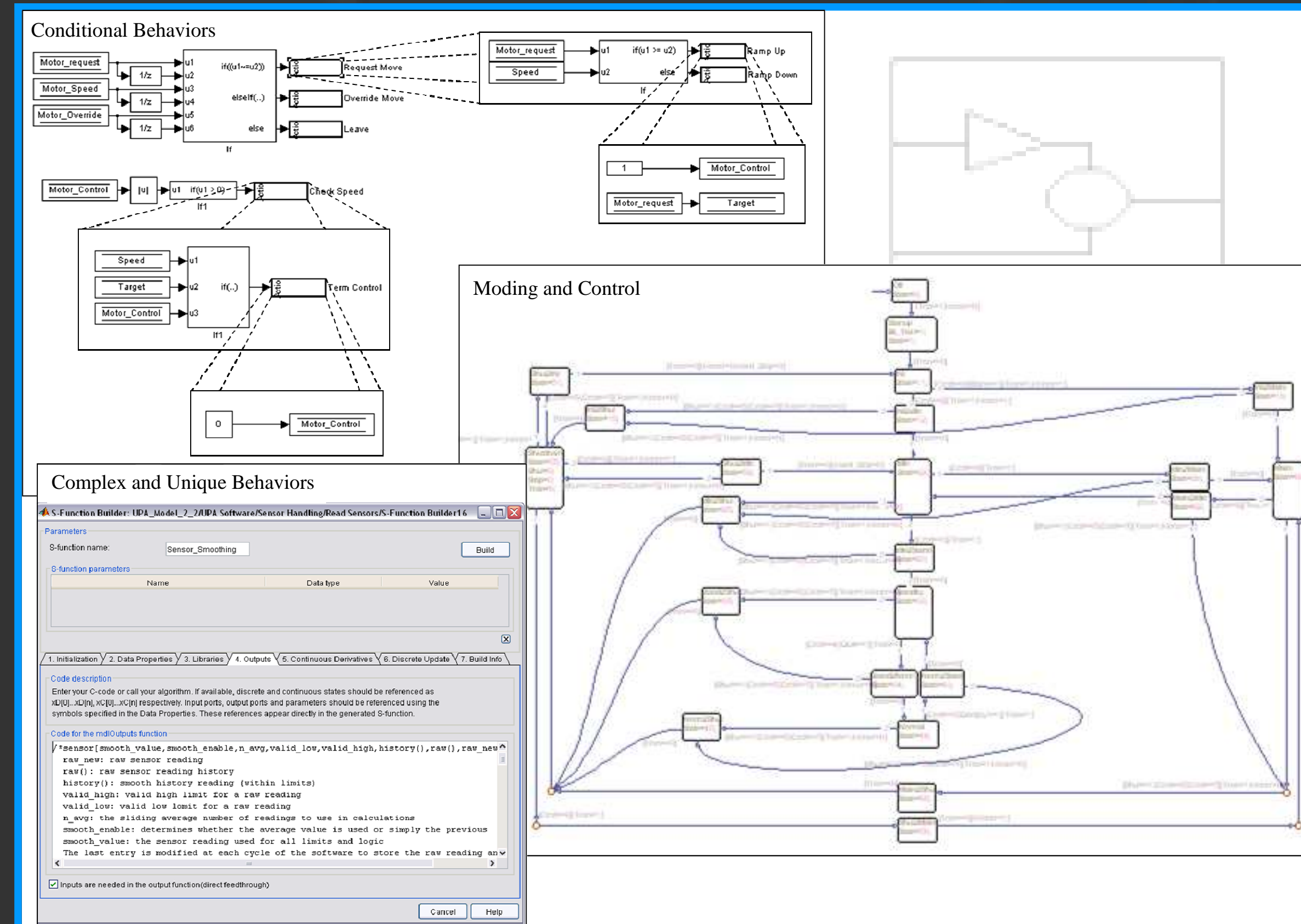


EXECUTABLE BEHAVIOR MODEL USING MATLAB SIMULINK

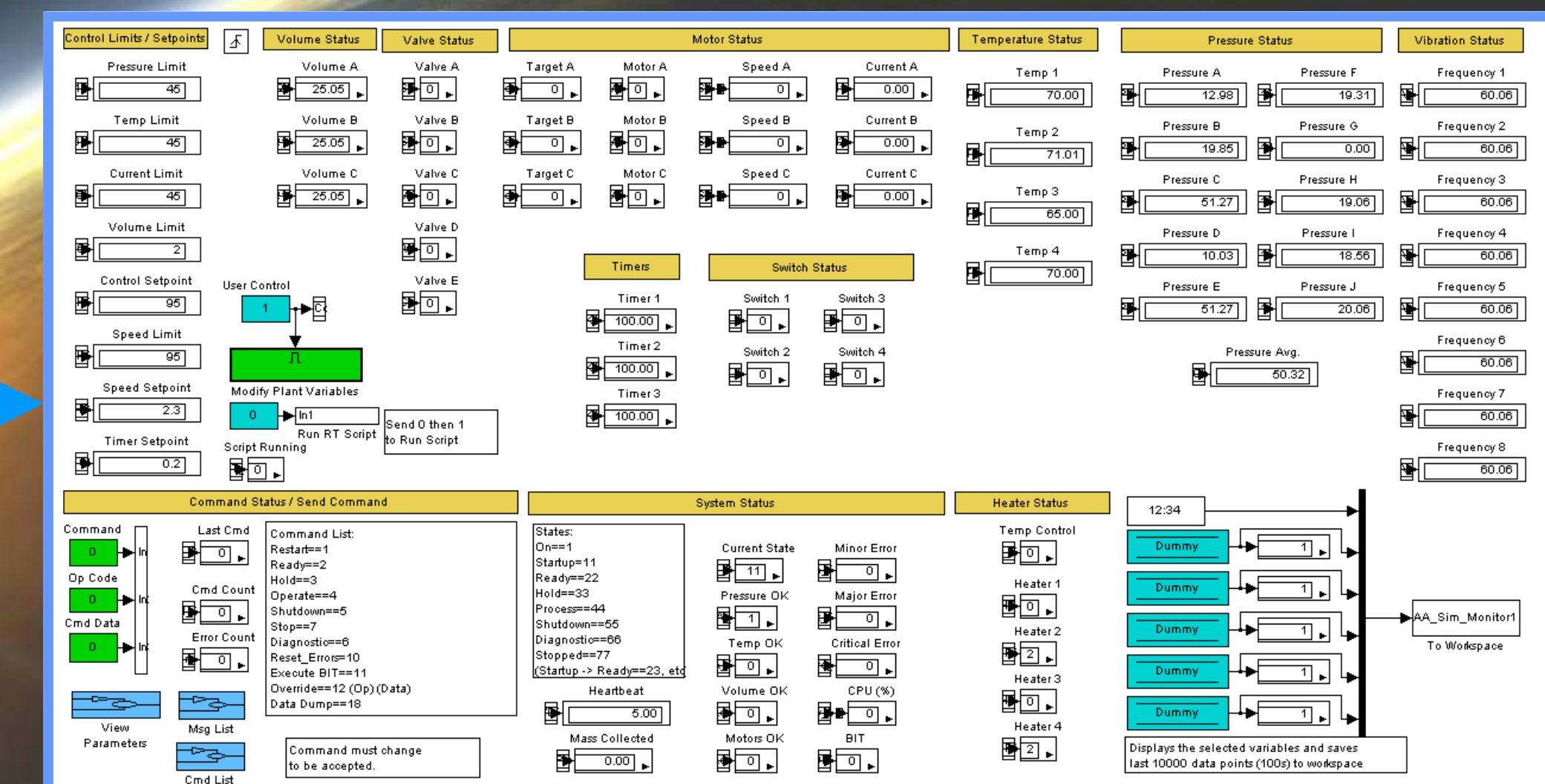


MODEL

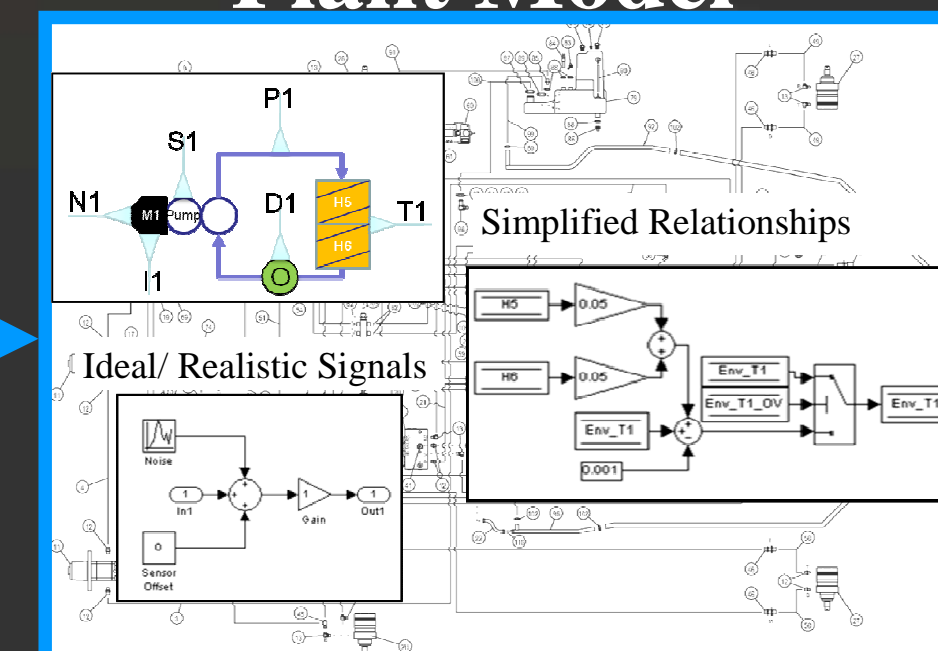
Software Model



User Interface



Plant Model



CLOSED LOOP SIMULATION

SOFTWARE REQUIREMENTS

MODEL BEHAVIOR & SYSTEM

SYSTEM INFORMATION

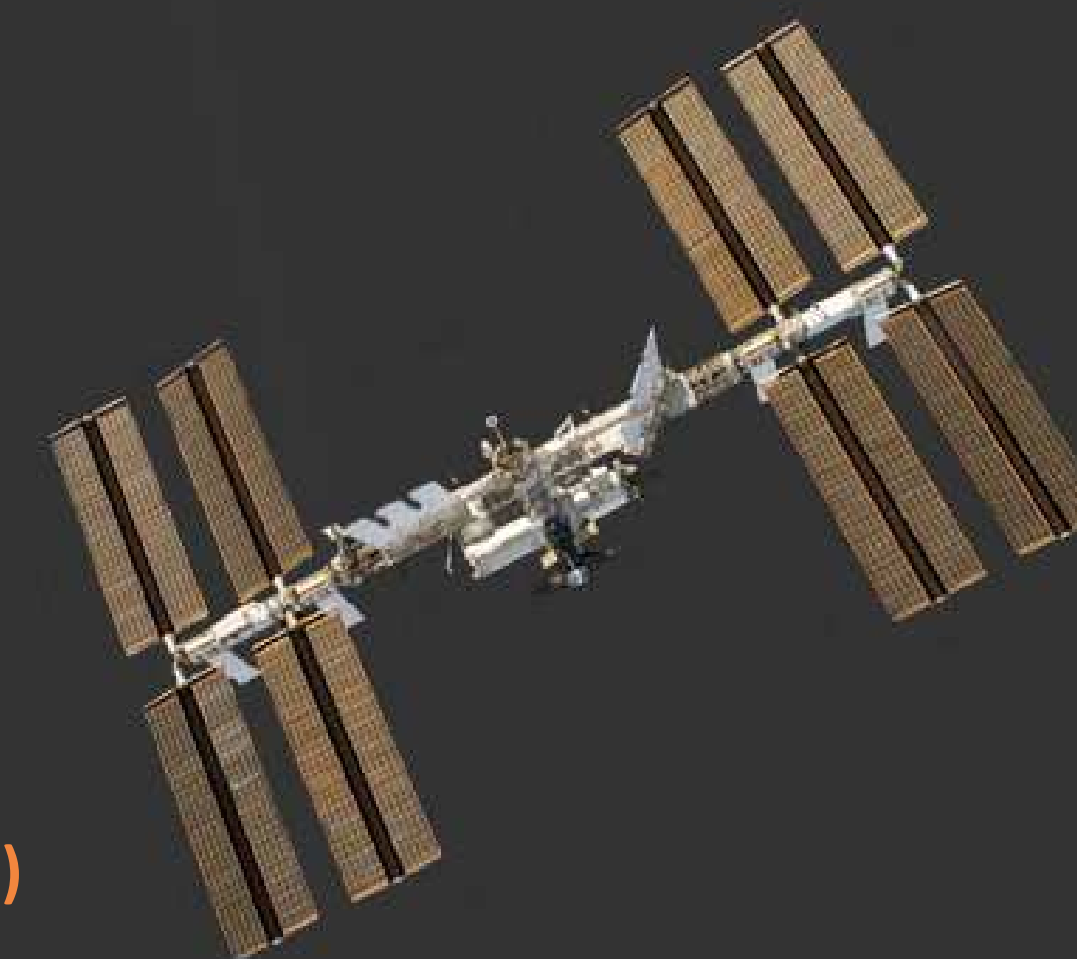
ANALYSIS & UNIT TESTING

PURPOSE

- Gain System Understanding:
- Uncover Requirement Deficiencies:
 - Completeness, Ambiguity
- Uncover Design Impacts:
 - Data Consistency, Control Flow, Testability
- Uncover Undesired Behavior:
 - Expand Developer formal testing.
 - Determine Conflicting & Unreachable States.
 - Determine Failure Scenarios.
 - Ensure system can handle multiple errors.
 - Verify long-term system operation.

BENEFITS & LIMITATIONS

- Benefits
 - Low Cost (4-5hr/requirement).
 - Captures Analysis and Understanding.
 - Allows analysis of complex behavior interactions.
- Limitations
 - Subject Matter Expert Required.
 - Does not replace traditional IV&V methods.
 - Model Fidelity tightly coupled with cost.
 - Method proven on smaller systems (~200 Requirements)



ISSUES

Issues - Ambiguous/Incorrect Requirements

Requirement does not contain enough information for analyst to model the behavior without making numerous assumptions. Requirement contains reference to wrong data item.

High Severity Issue - Incomplete Requirement

Motor Remains Active After System Shutdown. Requirement only accounts for nominal purge duration. Impact: Motor is unmonitored and may result in crew injury or fire.

Issue - Conflicting Requirement

Stopping System after detecting any severe or hazardous condition in all modes conflicts with the requirement to transition the system to a Maintenance Mode for any error detected in Initialized Mode.